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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050				
EXAMINER ZERVIGON, RUDY				
ART UNIT 1763		PAPER NUMBER		

DATE MAILED: 04/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/828,067

Applicant(s)

CURRY ET AL.

Examiner

Rudy Zervigon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 21-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 27, 2003 has been entered.

### ***Claim Rejections - 35 USC § 102***

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 21-28, and 36 and 37 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al (USPat. 6,403,491). Liu teaches a wafer processing apparatus (Figure 2) comprising:

- i. A processing chamber (112; column 10, lines 20-65) defined by walls (106)
- ii. A wafer supply opening (139; Figure 2) formed in one of the walls for transferring a wafer (10) into the chamber
- iii. A susceptor (55, Figure 21) in the chamber (112; column 10, lines 20-65) on which the wafer can be located so that an upper surface of the wafer faces the upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c) of the chamber (112; column 10, lines 20-65)
- iv. A manifold component (102; Figure 2, 4; column 12, lines 9-62) located on the chamber (112; column 10, lines 20-65) and, together with the upper surface of the upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c), define a manifold cavity (conduits between 103 and volume 112; Figure 4)

- v. An exhaust line (conduit for 114+42+138; Figure 2, 21) connected to the process chamber, for flowing a gas from the chamber (column 5, line 60 – column 6, line 5), connected such that the gas has a tendency to flow toward the exhaust line; and
- vi. A gas supply line (212; Figure 4) connected to the manifold component, wherein the upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c) has a plurality of gas supply openings (350a, 348; Figure 4, 7a,b; 225, Figures 8-11), substantially equal in size, each of gas supply openings formed into an upper surface (top surface of 717; Figure 7a) and out of a lower surface (lower surface of 717; Figure 7a) of the upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c) such that each gas supply opening is defined by a corresponding interior surface of the upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c), lower ends (714, 716; Figure 7b; 727, Figure 7c; 220a; Figure 10) of at least some of the gas supply openings extending at an angle other than at right angles relative to the upper surface of the wafer so that a gas, when exiting the openings flows at an angle other than at right angles relative to the upper surface of the wafer (column 14, lines 34-36; column 15, lines 38-50), the flow pattern from the openings counteracting the tendency of the gas to flow toward the exhaust line – reference is made to Figures 7b, 7c, and 11 that show flow directions counteracting the tendency of the gas to flow toward the exhaust line which is shown in Figure 2
- vii. An off-center exhaust line (114) connected to the gas chamber, for flowing a gas from the chamber
- viii. First (first 350a; Figure 4; 225; Figures 8-11) and second (second 350a; Figure 4; 225; Figures 8-11) ones of the openings on opposite sides of a point (traversed by symmetry axis of 134, Through the geometric center of plate 220; Figures 8-11) on the upper wall

(134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c), the first and second opening (714, Figure 7b; 225; Figure 10) having a lower end (bottom surface of 134, 225; Figure 10) which is angularly and oppositely displaced relative to an upper end (top surface of 134; 220) thereof in a selected direction about the point so that the openings jointly create a circular gas flow pattern in the chamber (112; column 10, lines 20-65)(column 16, lines 49-63; Figure 9, 10)

- ix. A third of the openings (225; Figures 8-11) on a side of the second opening opposing the first opening, has a lower end which is displaced in the first direction relative to an upper end thereof
- x. A channel (114; Figure 4) is defined within the chamber, the channel being concentric with the wafer (Figure 2), gas flowing radially outward over the wafer into the channel, and from the channel to the exhaust location and into the exhaust line (Figure 2)

***Claim Rejections - 35 USC § 103***

3. Claims 29-35 are rejected under 35 U.S.C. 103(a) as being obvious over Liu et al (USPat. 6,403,491) in view of Maher et al (USPat. 5,248,371).

The applied reference to Liu et al (USPat. 6,403,491) has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or

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declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

Liu is discussed above.

Liu only teaches uniformly distributed gas supply openings as discussed above. Additionally, Liu does not teach that the openings are more densely located in the upper wall than on the other side thereof. Liu does not teach the flow regime of operation as being either laminar or turbulent.

Maher teaches a similar gas distribution plate (90; Figure 4a) which has non-uniformly distributed gas supply openings (92, 94).

It would have been obvious to one of ordinary skill in that art at the time the invention was made for Liu to relocate his gas supply openings so that they are unevenly distributed, as taught by Maher, and to operate his apparatus such that the flow within the chamber is laminar.

Motivation for Liu to relocate his gas supply openings so that they are unevenly distributed, as taught by Maher, is to provide for a desired flow pattern within the reactor. Motivation for Liu to operate his apparatus such that the flow within the chamber is laminar is to provide for optimized operation of the apparatus, (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05).

***Response to Arguments***

4. Applicant's arguments filed October 27, 2003 have been fully considered but they are not persuasive.

5. Applicant states "The gas supply openings (pasages) of Liu are formed within a nozzle and not formed within the upper wall.". Applicant is directed to the body of the claim rejections stated above where the Examiner specifically cites:

"

...the upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c) has a plurality of gas supply openings (350a, 348; Figure 4, 7a,b; 225, Figures 8-11), substantially equal in size, each of gas supply openings formed into an upper surface (top surface of 717; Figure 7a) and out of a lower surface (lower surface of 717; Figure 7a) of the upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c) such that each gas supply opening is defined by a corresponding interior surface of the upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c)...

"

The Examiner is thus stating that Liu's upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c) meets Applicant's claimed "upper wall" item 32 in Figure 3 as claimed.

6. In response to Applicant's statement that "it is clear that it is the gas injection holes of the mini-gas distribution plate that the Examiner is equating with the gas supply openings of the claimed present invention" (lines 1-2, Page 10). Applicant has misinterpreted the Examiner's

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prior Office Action which affirmed a plurality of gas supply openings (350a, 348; Figure 4, 7a,b; 225, Figures 8-11) as Applicant's gas supply openings. As a result, items 340, 350a, and 348 belong to the embodiment of Figure 4 and 7a,b which meet applicant's claimed invention. In addition, items 225 of the embodiment of Figures 8-11 also meet applicant's claimed invention. In both cases, the passages and injection holes (350a, Figure 4; 220, Figure 8, 11, 12) are formed within the upper wall (134, 710, 220; column 10, line 66 - column 11, line 15; Figures 7a-f, 8-11; 717, Figure 7a-c) of the chamber (112, Figure 4).

7. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

8. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it was established in the prior office action that the motivation for Liu to relocate his gas supply openings so that they are unevenly distributed, as taught by Maher, is to provide for a

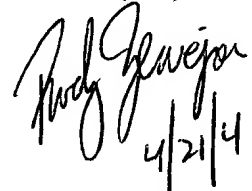


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desired flow pattern within the reactor. Similarly, motivation for Liu to operate his apparatus such that the flow within the chamber is laminar is to provide for optimized operation of the apparatus, (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc. v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05). As such, motivation is provided by those of ordinary skill in the art at the time the invention was made and is established in the teachings of both Liu and Maher.

### *Conclusion*

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after final fax phone number for the 1763 art unit is (703) 872-9311. The official before final fax phone number for the 1763 art unit is (703) 872-9310. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.

  
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